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Distribution of Ants (Insecta, Hymenoptera) in Chiaksan Mountain, Prov. Gangweon, Korea

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Abstract: To survey the appearance pattern of ants in Mt. Chiaksan, 1,358 colonies 0f ant species were collected in three courses for two years (2009~2010). As the result, the ant fauna of Mt. Chiaksan were found to be 57 species belonging to 27 genera under 6 subfamilies. Among them, 15 species were newly recorded to inhabit in Mt. Chiaksan: *Pachycondyla chinensis, P. pilosior*, *Hypoponera gleadowi, Proceratium itoi, Myrmica kotokui, M. kurokii, Stenamma ussuriensis*, *Leptothorax acervorum, Monomorium chinense, Mo. intrudens, Crematogaster vagulla, Camponotus vitiosus, Formica sanguinea, F. yessensis,* and *Lasius umbratus.* Consequently a total of 60 species under 27 genera of Formicidae are recorded from Mt. Chiaksan.

Keywords: Formicidae, ant fauna, Mt. Chiaksan, colony frequency

Introduction

Ants tend to make their nest mainly in soil, even though some are tree-dwelling. They are distributed world-wide due to their variable food range and strong tolerance to environmental risks. Ants have great success stories in the history of their survival on Earth. Living ants are currently classified into 27 subfamilies and 433 genera (Bolton, 2003) and it has been estimated that about 22,000 species exist on earth. Interactions with ants have shaped the evolution of a variety of other organisms to an astonishing degree. Ants participate in symbioses both facultative and obligate, with more than 465 plant species in over 52 families (Jolivet, 1996), with thousands of arthropod species (Kistner, 1982; Hölldobler & Wilson, 1990), and with as-yet unknown numbers of fungi and microorganisms (Schultz & McGlynn, 2000; Mueller *et al*., 2001).

On the ant fauna of Mt. Chiaksan, Choi and Park (1998) first recorded 45 species under 23 genera belonging to 4 subfamilies including 36 species from the literatures. The ants in the forest ecosystem play an important role in the food stability of predators. This study provides the baseline of academic resources for preserving and managing the forest ecosystem by providing information about the status of the ants in Mt. Chiaksan, Gangwon-do, Korea. This study is carried out to revise the ant fauna and distribution of Mt. Chiaksan with various collections and reviews from the literature.

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Materials and Methods

This survey contains collections performed in Mt. Chiaksan located in Wonju, Gangwon-do in the three courses from 15th July, 2009 to 21th August, 2010. The collection courses are presented in Fig. 1. To collect the ants, I used

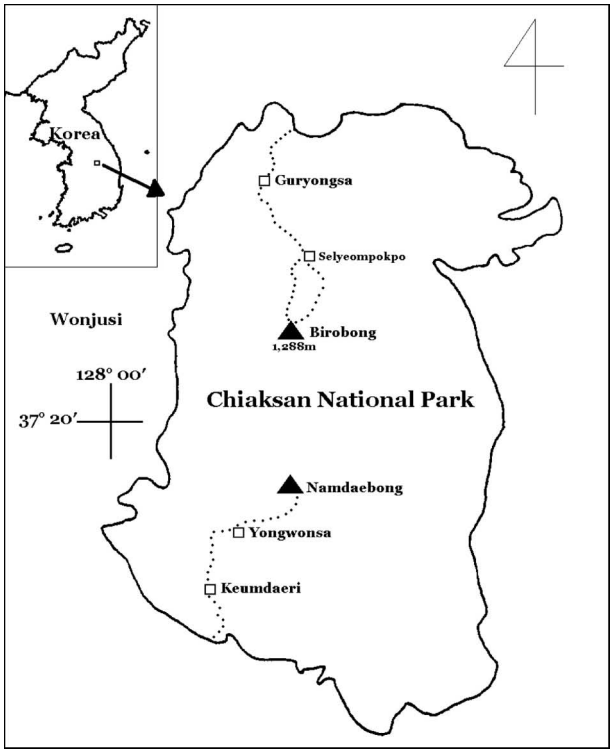

Fig. 1. Map of Mt. Chiaksan. Dotted line shown in the collection courses.

Aspirator, sweeping and beating methods where the ants were not visible because of their very small size. To survey the number of species in each genus and its colony frequency calculated qualitative collection were carried for 2 hours every altitude of 200 meters. For identification, collected specimens were preserved in 99% absolute ethyl alcohol and identified under dissection stereomicroscope (ZEISS, Discovery V8). The specimens were stored in the Ant Specimen Room of Forest Entomology laboratory at Sangji University, Wonju, South Korea.

Results

The ants in Mt. Chiaksan were found to be 6 Subfamilies: Amblyoponinae, Ponerinae, Proceratiinae, Myrmicinae, Dolichoderinae and Formicinae exclusive of Cerapachinae, which make 7 subfamilies in Korea. From 15th July in 2009 to 21th August in 2010, 1,687 colonies of ant were collected and as a result, 57 species belonging to 27 genera under 6 families were identified as in Table 1.

Among them, 15 new species were found in Mt. Chiaksan (Table 1); *Pachycondyla chinensis, P. pilosior*, *Hypoponera gleadowi, Proceratium itoi, Myrmica kotokui, M. kurokii, Stenamma ussuriensis*, *Leptothorax acervorum, Monomorium chinense, Mo. intrudens, Crematogaster vagulla, Camponotus vitiosus, Formica sanguinea, F. yessensis,* and *Lasius umbratus.* And three species, *Aphaenogaster famelica, Formica hayashi,* and *Lasius brunneus*, which Choi and Park(1998) recorded, were not collected. It can be said that Choi and Park's repor (1998) on ant survey in Mt. Chiaksan was presented with insufficient description in most species, and some misidentifications and incorrect names were found. Especially, their records of three species leave something to be doubted, becuase any preserved specimens have not been found at Mt. Chiaksan through this study. Therefore, the ant fauna of Mt. Chiaksan were confirmed to be 60 species belonging to 27 genera under 6 subfamilies when 45 species under 23 genera in literature were included. The ratios of colonies by subfamily

Table 1. List of ant species found in this study compared to the previous publication (Choi and Park, 1998) in Mt. Chiaksan

Scientific name	Korea name	1998	2010
AMBLYOPONINAE			
Amblyopone silvestrii	톱니침개미	○	○
PONERINAE			
Cryptopone sauteri	장님침개미	○	○
Pachycondyla chinensis	왕침개미		●
Pachycondyla javana	일본침개미	○	○
Pachycondyla pilosior	털보장님침개미		●
Ponera japonica	침개미	○	○
Ponera scabra	거치른침개미	○	○
Hypoponera gleadowi	황침개미		●
PROCERATIINAE			
Proceratium itoi	배굽은침개미		●
MYRMICINAE			
Myrmica excelsa	항아리뿔개미	○	○
Myrmica sulcinodis	어리뿔개미	○	○
Myrmica kotokui	코토쿠뿔개미		●
Myrmica kurokii	쿠로키뿔개미		●
Myrmica jessensis	곰배자루뿔개미	○	○
Myrmica ruginodis	빗개미	○	○
Stenamma owstoni	오스톤개미	○	○
Stenamma ussuriensis	우수리개미		●
Aphaenogaster famelica	황장다리개미	○	
Aphaenogaster japonica	일본장다리개미	○	○
Messor aciculatus	장구개미	○	○
Pheidole fervida	극동혹개미	○	○
Pristomyrmex pungens	그물등개미	○	○
Leptothorax acervorum	북방호리가슴개미		●
Temnothorax congruus	호리가슴개미	○	○
Temnothorax spinosior	긴호리가슴개미	○	○
Temnothorax nassonovi	낫소노브호리가슴개미	○	○
Tetramorium tsushimae	주름개미	○	○
Solenopsis japonica	일본열마디개미	○	○
Monomorium chinense	검정꼬마개미		●
Monomorium intrudens	배검은꼬마개미		●
Vollenhovia emeryi	에메리개미	○	○
Myrmecina nipponica	방패개미	○	○
Crematogaster osakensis	노란밑드리개미	○	○
Crematogaster teranishii	검정밑드리개미	○	○
Crematogaster vagulla	등굽은밑드리개미		●
Strumigenys lewisi	비늘개미	○	○
DOLICHODERINAE			
Dolichoderus sibirica	시베리아개미	○	○
FOMICINAE			
Camponotus atrox	한국홍가슴개미	○	○
Camponotus japonica	일본왕개미	○	○
Camponotus kiusiuensis	갈색발왕개미	○	○
Camponotus quadrinotatus	네눈개미	○	○
Camponotus itoi	이도왕개미	○	○
Camponotus nipponensis	털왕개미	○	○
Camponotus vitiosus	제주왕개미		●
Formica japonica	곰개미	○	○
Formica lemani	레만개미	○	○
Formica hayashi	숲곰개미	○	
Formica sanguinea	분개미		●
Formica yessensis	불개미		●
Lasius alienus	누은털개미	○	○
Lasius brunneus	나도누은털개미	○	
Lasius umbratus	황털개미		●
Lasius flavus	황개미	○	○
Lasius japonicus	고동털개미	○	○
Lasius spathepus	민냄새개미	○	○
Lasius morisitai	강릉냄새개미	○	○
Lasius terarishii	테라니시냄새개미	○	○
Paratrechina flavipes	스미드개미	○	○
Paratrechina sakurae	사쿠라개미	○	○
Polyrhachis lamellidens	가시개미	○	○

Table 2. Number of species in each genus and its colony frequency

Genus	Number			
	Species (%)		Colony (%)	
	1998	2012	1998	2012
Amblypone	1(2.2)	1(1.8)	1(0.1)	2(0.1)
Cryptopone	1(2.2)	1(1.8)	1(0.1)	3(0.1)
Pachycondyla	1(2.2)	3(5.5)	8(1.1)	18(1.1)
Ponera	2(4.4)	2(3.6)	14(1.9)	32(1.9)
Hypoponera		1(1.8)		3(0.1)
Proceratium		1(1.8)		2(0.1)
Myrmica	4(8.8)	6(10.9)	78(10.5)	203(12.0)
Stenamma	1(2.2)	2(3.6)	1(0.1)	2(0.1)
Aphaenogaster	2(4.4)	1(1.8)	44(6.0)	109(6.5)
Messor	1(2.2)	1(1.8)	5(0.7)	12(0.7)
Pheidole	1(2.2)	1(1.8)	62(8.3)	169(10.0)
Pristomyrmex	1(2.2)	1(1.8)	7(0.9)	13(0.8)
Leptothorax	3(6.7)	1(1.8)	10(1.3)	37(2.2)
Temnothorax		3(5.5)		7(0.4)
Tetramorium	1(2.2)	1(1.8)	53(7.1)	128(7.6)
Solenopsis	1(2.2)	1(1.8)	1(0.1)	17(1.0)
Vollenhovia	1(2.2)	1(1.8)	9(1.2)	19(1.1)
Myrmecina	1(2.2)	1(1.8)	4(0.5)	8(0.5)
Crematogaster	2(4.4)	3(5.5)	10(1.4)	26(1.5)
Strumigenys	1(2.2)	1(1.8)	2(0.3)	12(0.7)
Dolichoderus	1(2.2)	1(1.8)	2(0.3)	9(0.5)
Camponotus	6(13.3)	7(12.7)	57(7.6)	157(9.3)
Formica	3(6.7)	4(7.3)	79(10.6)	191(11.3)
Lasius	7(15.6)	7(12.7)	206(27.6)	329(19.5)
Paratrechina	2(4.4)	2(3.6)	90(12.1)	173(10.3)
Polyrhachis	1(2.2)	1(1.8)	2(0.3)	6(0.4)
Total	45(100)	55(100)	746(100)	1,687(100)

were presented as in Table 2. Amblyoponinae amount to 0.1% Ponerinae 3.2%, Proceratiinae 0.1%, Myrmicinae 45.4%, Dolichoderinae 0.5% and Fomicinae 50.7% was the largest subfamily in 2010. Among 27 genera, genus *Lasius* was the largest species with 12.3% and its ratio of colonies was 19.5%. The second-largest genus, *Camponotus* was 10.5% by the number of species and 12.0% by colony. Genus *Pheidole* and *Tetramorium* had only one species, but its ratio by colony was comparatively high with 10.0% and 7.6% respectively.

For qualitative survey, the collection was carried out throughly and all colonies found were collected. Table 2 shows that dominant species is genus *Lasius* which has 329 colonies among 1,687 with 19.5% in three courses. Secondly, genus *Myrmica* has 203 colonies with 12.0%. And genus *Formica* is 191 colonies with 11.3%, genus *Paratrechina* 173 colonies with 10.3%, genus *Pheidole* 169 colonies wite 10.0% and genus *Camponotus* 157 colonies with 9.3%. The ratio of these 6 genera amounts to 72.4% of all.

Seven species, *Paratherechina flavipes, Formica japonica, Lasius alienus, Pheidole fervida, Tetramorium tsushimae, Myrmica kotokui,* and *Aphaenogaster japonica* were considered dominant species. When ant abundance data were grouped by altitude, *T. tsushimae, Paratherechina flavipes,* and *Lasius alienus* were the dominant species in low-lying area (300~500m) and *Myrmica kotokui* and *Aphaenogaster japonica* were dominant in high-lying area (600~1,000m).

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